Central Air Conditioners and Heat Pumps
Manufacturer Impact Analysis Summary of Results
U.S. Department of Energy
June, 2000

The Department conducted an analysis of the central air conditioning manufacturing industry to determine the level of impact that a new efficiency standard would have on the industry's financial performance. The Manufacturer Impact Analysis (MIA) entailed interviews of six major manufacturers responsible for 90 percent of sales of residential unitary equipment, two niche product manufacturers, and four compressor manufacturers. Information gathered during the engineering analysis through interviews and reverse engineering also contributed to the MIA.

We used the information to model the industry's financial structure in a modified version of the Government Regulatory Impact Model (GRIM). The GRIM projects income and cash flows using information on production costs, operating expenses, prices, shipments, and investments. It is the primary tool for assessing impacts on manufacturers.

Two GRIM models were developed to represent two competing approaches to the marketplace. The first model represents manufacturers who offer a higher level of customer and dealer support and focus on product differentiation. These manufacturers typically have higher operating costs and depend on sales of premium or high efficiency products for a substantial portion of their profits. The second model represents manufacturers who strive to keep operating costs low, passing savings on to customers in the form of lower prices. The profitability of this group does not depend on differentiation and premium products to the same extent as does the second group. Because raising product efficiency reduces the options that higher cost manufacturers have to "sell up", efficiency standards can harm their performance and benefit their lower cost competitors.

Tables 1 through 5 present the GRIM results for the unitary air conditioning industry for four scenarios based on the industry-provided mean cost multipliers (three efficiency mix scenarios (NAECA, Roll-up, Shift) based on the current 18 year product life assumption and one efficiency mix scenario (NAECA) based on a 14 year life) and one scenario based on reverse engineering cost multipliers, the 18 year product life, and the NAECA efficiency mix scenario. Results assume that lower cost manufacturers control 25 percent of the market and higher cost manufacturers control 75 percent. Since we did not collect information regarding the cost or investments involved in manufacturing product solely at 18 SEER, we did not assess impacts under Max Tech (Standard Level 5).

Table 1: Changes in Industry Net Present Value — Industry Relative Cost, 18 Year Life, NAECA Efficiency Mix

Standard Level	Net Present Value ($ million)	Change in NPV from Base Case	
		$ million	%
Base	$ 1,603	--	--
1	$ 1,566	$ (37)	-2%
2	$ 1,417	$ (186)	-12%
3	$ 1,406	$ (197)	-12%
4	$ 1,420	$ (183)	-11%

Table 2: Changes in Industry Net Present Value — Industry Relative Cost, 18 Year Life, Roll-up Efficiency Mix

Standard Level	Net Present Value ($ million)	Change in NPV from Base Case	
		$ million	%
Base	$ 1,603	--	--
1	$ 1,437	$ (166)	-10%
2	$ 1,270	$ (333)	-21%
3	$ 1,267	$ (336)	-21%
4	$ 1,299	$ (304)	-19%

Table 3: Changes in Industry Net Present Value — Industry Relative Cost, 18 Year Life, Shift Efficiency Mix

Standard Level	Net Present Value ($ million)	Change in NPV from Base Case	
		$ million	%
Base	$ 1,603	--	--
1	$ 1,740	$ 137	9%
2	$ 1,825	$ 222	14%
3	$ 1,854	$ 251	16%
4	$ 1,914	$ 311	19%

Table 4: Changes in Industry Net Present Value — Industry Relative Cost, 14 Year Life, NAECA Efficiency Mix

Standard Level	Net Present Value ($ million)	Change in NPV from Base Case	
		$ million	%
Base	$ 1,726	--	--
1	$ 1,701	$ (25)	-1%
2	$ 1,558	$ (168)	-10%

3	$	1,555	$ (171)	-10%
4	$	1,598	$ (128)	-7%

Table 5: Changes in Industry Net Present Value — Reverse Engineering Relative Cost, 18 Year Life, NAECA Efficiency Mix

Standard Level	Net Present Value ($ million)		Change in NPV from Base Case	
			$ million	%
Base	$	1,539	--	--
1	$	1,509	$ (30)	-2%
2	$	1,380	$ (159)	-10%
3	$	1,368	$ (171)	-11%
4	$	1,370	$ (169)	-11%

Table 6 expresses the differential impacts between the groups of manufacturers with lower and higher operating costs.

Table 6: Change in NPV (%) Comparison Between Lower and Higher Cost Manufacturers

Standard Level	Industry Relative Cost								Reverse Engineering Relative Cost	
	NAECA		NAECA-14 Year Life		Roll-up		Shift		NAECA	
	Lower Cost	Higher Cost	Lower Cost	Higher Cost	Lower Cost	Higher Cost	Lower Cost	Higher Cost	Lower Cost	Higher Cost
1	5%	-5%	6%	-4%	3%	-16%	9%	9%	5%	-4%
2	7%	-17%	9%	-16%	5%	-31%	14%	16%	7%	-16%
3	9%	-19%	11%	-16%	6%	-32%	16%	17%	8%	-17%
4	15%	-19%	19%	-16%	13%	-31%	19%	20%	12%	-18%

For the group most negatively impacted, the higher cost group, Table 7 expresses the permanent reduction in Return on Invested Capital (ROIC) associated with a new standard in the NAECA and Roll-up efficiency mix scenarios (industry relative costs, 18 year life). A reduction in ROIC increases the likelihood that the company will choose to exit the market or sell its assets rather than to make the investments required to move to the new efficiency level.

Table 5: Return on Invested Capital (ROIC) in 2011 for Higher Cost Manufacturers

Standard Level	NAECA	Roll-up
Base	13.3%	13.3%
1	12.3%	10.7%
2	10.2%	8.4%
3	10.0%	8.3%
4	9.6%	8.3%

The Technical Support Document that will accompany the Notice of Proposed Rulemaking will provide more details on the MIA assumptions, methodology, and results, and conclusions, including the assessments of impacts on niche manufacturers and compressor manufacturers.